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# Use of Turkish Verbal Morphology by Children with Primary Language Impairment and their Typically Developing Peers

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## Recommended Citation

Terziyan, Treysi, "Use of Turkish Verbal Morphology by Children with Primary Language Impairment and their Typically Developing Peers" (2016). *Master's Theses*. 943.  
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Use of Turkish Verbal Morphology by Children with  
Primary Language Impairment and their Typically  
Developing Peers

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B.A., Franklin & Marshall College, 2010

M.A., Boğaziçi University, 2013

A Thesis

Submitted in Partial Fulfillment of the  
Requirements for the Degree of

Master of Arts

At the

University of Connecticut

2016

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2016

# APPROVAL PAGE

Masters of Arts Thesis

## Use of Turkish Verbal Morphology by Children with Language Impairment and their Typically Developing Peers

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## **Abstract**

Language impairment in languages other than English has not been exhaustively studied. In the current study, we developed tasks that elicit productions of verbal morphemes from Turkish-speaking children. In the first part of the study we developed the tasks and piloted them on adults and school-aged children. In the second part of the study, we compared the performance of younger children with and without primary language impairment on the tasks we had developed. Our results suggested that adults and school-aged children were at or near ceiling on our tasks. Furthermore, the younger typically developing children performed near ceiling, whereas the children with primary language impairment made significantly more errors with grammatical inflections. Moreover, the pattern of error was dissimilar between these two groups of children.



## **Introduction**

Language impairments in children are of interest to both researchers and clinicians who work with these populations of children. This impairment has been alluring to researchers because it poses interesting questions about human cognition and its relation to language (e.g., Bloom, 1999; Tomblin & Pandich, 1999). Additionally, a greater understanding of the underlying causes of language impairments can spark the development of more sensitive measures of language, as well as better treatment outcomes for these children. The bulk of work on language impairments has been conducted on English-speaking children with relatively limited research on other languages (Leonard et al., 1992). The purpose of the present study was to explore the production of grammatical morphemes in Turkish-speaking children with language impairments to promote the development of a sensitive measure of language impairment in this language.

### **1. Definition of Language Impairment**

Specific language impairment (SLI) is a term used in the research literature to describe children who display a broad spectrum of language deficits despite having normal hearing, no neurological impairment and no social-emotional problems (Stark & Tallal, 1981). Clinically, children with SLI would not receive this label, but rather are diagnosed as having a receptive and/or expressive language impairment (Leonard, 2000). Even though SLI is a term designated by researchers, there is a lack of consensus on the necessary criteria to receive this classification. For example, there is disagreement about the number of standard deviations below the mean in language

performance an individual must receive to be diagnosed with SLI. Some researchers use -1.0 standard deviations (SD) as the threshold (Flax et al., 2003; Ford & Milosky, 2003; Paradis, Crago, Genesee & Rice, 2003 as cited in Spaulding, Plante & Farinella, 2006), while others use -1.5 SD (Dollaghan, 2004; Gray, 2003; Maillart, Schelstraete & Hupet, 2004; Leonard et al., 2003; Wells & Peppé, 2003 as cited in Spaulding, Plante & Farinella, 2006). Moreover, researchers do not agree on a cut-off score for non-verbal abilities with thresholds ranging from -1 SD (Alt, 2011; McArthur & Bishop, 2005; Perona, Plante & Vance, 2005 as cited in Gallinat & Spaulding, 2014) to -2 SD (Archibald & Gathercole, 2006, 2007; Evans, Saffran & Robe-Torres, 2009; Munson, Kurtz & Windsor, 2005).

As noted in Stark and Tallal's definition (1981), the primary characteristic of SLI is a significant deficit in language. However, more recent studies have begun to question whether the impairment is *specific* to language (e.g., Miller, Kail, Leonard & Tomblin, 2001; Oram Cardy, Tannock, Johnson & Johnson, 2010). Subtle non-verbal deficits may contribute to these children's problem with language acquisition (e.g., Collisson, Grela, Spaulding, Rueckl & Magnuson, 2014; Gallinat & Spaulding, 2014; Grela, Collisson & Arthur, 2011). In particular, Gallinat and Spaulding (2014) have shown that children with SLI, who were considered to have non-verbal abilities "within the normal range", nonetheless scored significantly lower on non-verbal abilities compared to typically developing (TD) children. Consistent with their findings, children with SLI were shown to have significantly lower sustained attention abilities (Ebert & Kohnert, 2011) and poorer executive functioning skills such as non-verbal working memory, non-verbal inhibition and non-verbal planning (Henry, Messer & Nash, 2012).

Moreover, children with SLI have also been shown to have deficits in processing the syntax of music (Jentschke, Koelsch, Sallat & Friederici, 2008) and in motor skills (for a review, see Hill, 2001).

For the reasons noted above, researchers have restructured the way they view language impairment. More specifically, the current trend in the literature is to use the term “primary language impairment” (e.g., Blackwell, Harding, Babayiğit & Roulstone, 2015; Ebert, 2014; Kan & Windsor, 2010; McKean, Letts & Howard, 2013), which suggests that language deficits are the primary but not the *only* deficits as weaknesses in other areas may also exist. The current study adopts this perspective and uses the term “primary language impairment” (PLI) rather than “specific language impairment”.

## **2. Language Impairment Across Languages**

What is known on the manifestation of PLI comes from research on English speakers— thus far the most studied language in terms of language impairment (Leonard et al., 1992). Studies on PLI in English revealed that PLI impacts all areas of language, with morphosyntactic skills being most deficient (Leonard, 2000). That is, grammatical morphology appears to be the area in which children with PLI are least competent (Leonard, 2000). Children with PLI are inconsistent in their use of grammatical inflections such as the third person singular marker, regular past tense, and both copula and auxiliary forms of the verb to be (e.g., Grela, Collisson & Arthur, 2011; Leonard, Eyer, Bedore & Grela, 1997). English-speaking children with PLI usually omit these grammatical inflections and rarely substitute them with other inflections (Grela, Collisson & Arthur, 2011). Leonard (2000, p 4) provides a typical error produced

by a child with PLI in Example (1), where the child omitted the present tense third person marker “-s” and the pronoun “her”.

- (1) \*Kathy brush teeth.  
“Kathy brushes her teeth.”

(Leonard, 2000 p4)

Grammatical morphology, specifically inflectional morphology, has proven to be the most informative indicator of language impairment in English (Leonard, 2000). This is also the case in German, which is a language closely related to English (Leonard, 2000). However, PLI can manifest itself differently depending on the language’s reliance on inflectional morphology. For example, in Vietnamese, a language with no inflectional morphology (Tran & Bruening, 2009), PLI is not reflective of children’s inflectional morphology skills. PLI in Vietnamese manifests with syntactic errors, namely word order errors as well as omission of words (Hoang, Schelstraete, Tran, & Bragard, 2014). On the other hand, in languages with a limited set of inflectional morphology, such as English (Finegan, 2014), almost all of the inflections appear to be affected by PLI (Leonard, 2000). In languages with numerous inflections, such as Italian (Rowlett, 1998), the manifestation of PLI is not as straightforward seeing that some inflections appear to be affected while others do not (Bortolini, Caselli & Leonard, 1997).

A method of analyzing the degree to which languages rely on inflectional morphology has been provided in The World Atlas of Language Structures (WALS: Dryer & Haspelmath, 2013). Researchers behind WALS have developed a system that generates a numerical value based on the richness of grammatical morphology associated with each language (Dryer & Haspelmath, 2013). This system is called

“categories per word” and depends on how many categories an inflected form of a verb can express in a language.

Table 1

*Categories per word value of various languages*

(adapted from Dryer & Haspelmath, 2013)

| <u>Categories per Word</u> | <u>Language</u>  |
|----------------------------|--|
| 0-1                        | Vietnamese   |
| 2-3                        | English, German  |
| 4-5                        | French, Hebrew, Hungarian, Persian, Japanese, Italian <sup>1</sup> |
| 6-7                        | Turkish, Arabic, Korean  |

According to their system, languages range from a ranking of 0 to 13 based on the richness of the inflectional system where 0 would be a sparsely inflected language and 13 would be a highly inflected language as presented in Table 1. For example, grammatical inflections marking English verbs can denote tense and person agreement; therefore, the categories per word value of English is two. German has an analogous value for categories per word. Both English and German are considered poorly-inflected languages. On the other hand, the categories per word value of Turkish is between six and seven. Languages, which also have a high WALS value similar to Turkish, are French, Hebrew, Hungarian, Persian, Japanese, Italian, Arabic, and Korean. These languages have values between four and seven for categories per word. However, not

---

<sup>1</sup> There is no designated categories per word value for Italian in WALS but it has been put in the same category as French because Rowlett (1998) that Italian’s inflectional morphology is “relatively rich” analogous to French’s.

all these languages incorporate inflections to words in the same manner. These languages can be divided into three categories according to how they implement inflections: ablaut, fusional and agglutinative. Below, each category of highly inflectional languages will be discussed separately in terms of language impairment.

## 2.1 PLI in Highly Inflected Ablaut Languages

The ablaut category of languages involves a rule-based change in the vowel of the root word; hence, it cannot be separated into morphemes (Stonham, 1994).

Examples of ablaut can be found in English (Stonham, 1994), as presented in Table 2.

Table 2

*Examples of ablaut in English.*

(adapted from Stonham, 1994)

| <u>Present Tense</u> | <u>Past Tense</u> | <u>Past Participle</u> |
|----------------------|-------------------|------------------------|
| sing                 | sang              | sung                   |
| begin                | began             | begun                  |
| drink                | drank             | drunk                  |
| swim                 | swam              | swum                   |

Hebrew is a richly inflected ablaut language. Research has shown that Hebrew-speaking children with PLI generally have little difficulty with present and past tense agreements and their proficiency in these tenses are on par with younger typically developing (TD) children matched for mean length of utterance (MLU) (Dromi et al., 1999). However, errors were noted with agreement (i.e., using the vowel pattern for another person), pattern (i.e., using the wrong vowel pattern for that verb) and bare

stem verbs (i.e., omitting the inflections). No differences were observed between TD children matched for MLU and children with PLI with their usage of nominal gender and number agreement (Dromi, Leonard & Shteyman, 1993). In contrast, children with PLI learning Hebrew demonstrated significant difficulties in using accusative case marking (Rom & Leonard, 1990). Rom and Leonard (1990) observed that the Hebrew-speaking children in their study would often omit the accusative suffix in obligatory contexts of conversational speech. Interestingly, the majority of errors were found on non-final syllables (Leonard, 2000). For example, while trying to say “malbish” (*dress*), children with PLI might say “albish”. Overall, Hebrew-speaking children with PLI seemed equally likely to make commission errors (i.e., substitution) and omission errors (Leonard et al., 2000).

Arabic is another ablaut language with even richer morphology than Hebrew and has a WALS rating between 6 and 7. Abdalla and Crago (2008) investigated spontaneous speech samples from 30 children with or without PLI and found that children with PLI produced significantly fewer correct forms of the present tense, past tense, and agreement (person, number and gender). Most incorrect productions of verb forms included only a single error (i.e., either tense or agreement) (Abdalla & Crago, 2008). The most common error with verbal morphology was to use non-tensed forms instead of tensed ones (Abdalla & Crago, 2008). Deficits in grammatical morphology of Arabic-speaking children with PLI are also apparent in nominal morphology (Abdalla, Aljenaie & Mahfoudhi, 2013). Arabic-speaking children with PLI produced significantly fewer nominal markers correctly than their age-matched TD peers during elicited production tasks (Abdalla, Aljenaie & Mahfoudhi, 2013). An interesting pattern emerged

between the types of errors made by Arabic-speaking children on verbal and nominal morphology. Both TD children and children with PLI made omission errors on verbal morphology. On the other hand, TD children were more likely to make commission errors on nominal morphology (e.g., saying “tʃalba:t” instead of “tʃila:b” ‘dogs’), whereas the children with PLI were again more likely to make omission errors on nominal morphology (e.g., saying “tʃalb” instead of “tʃila:b” ‘dogs’) (Abdalla, Aljenaie & Mahfoudhi, 2013).

## **2.2 PLI in Highly Inflected Fusional Languages**

In fusional languages, words can be segmented into distinct morphemes such as root, prefix and suffix (Dryer & Haspelmath, 2013). However, these suffixes or prefixes cannot always be segmented into a single corresponding meaning (Pizzuto & Caselli, 1994). French verbal conjugations demonstrate an exemplar of the characteristic of a fusional language because the single suffix added to verb denotes both tense and person agreement. For example in the conjugated verb “mangeons”, the suffix –ons denotes both present tense and first person plural agreement.

Language impairment in fusional languages with relatively rich inflectional morphology, namely Italian and French, has been studied in the past. Italian children with PLI do not differ from their TD peers on nominal plural inflections, third person copula forms, third person singular inflections, and first person singular and plural verb inflections (Bortolini, Caselli & Leonard, 1997). However, when probed for productions of articles and third person plural inflections, children with PLI made significantly more errors than age- and MLU-matched TD children (Bortolini, Caselli & Leonard, 1997). Other inflections affected by Italian children with PLI include auxiliary verbs, infinitives,



and present tense verb inflections (Leonard & Bortolini, 1998). The most common errors observed in the productions of children with PLI were commission errors (e.g., using “dorme” [‘he sleeps’] or “dormire” [‘to sleep’] for “dormono” [‘they sleep’]). They were rarely observed to make omission errors (Bortolini et al., 1997). Leonard and Bortolini (1998) noted that Italian children with PLI were likelier to make errors on non-final weak syllables. Similarly, Hebrew-speaking children with PLI made errors in the same type of syllables (Leonard, 2000).

The deficits demonstrated by Italian-speaking children with PLI do not encompass all inflectional morphology in Italian seeing that Italian-speaking children are at age-level competency in their usage of 5/10 of the inflections mentioned above (Bortolini et al., 1997; Leonard & Bortolini, 1998). This is also true for French. Language samples gathered from French-speaking children with PLI (age range = 3;1-4;6) and without PLI (age range = 1;8-4;6) revealed no differences in the productions of grammatical morphology (Thordardottir & Namazi, 2007). Thordardottir and Namazi (2007) concluded that the language of French-speaking children with PLI was delayed but still paralleled typical development. Other researchers have also come to this conclusion (e.g., Jakubowicz & Nash, 2001). However, when productions of tense inflections (present and past) were elicited from children with LI, their performance was lower than their age-matched peers (Jakubowicz & Nash, 2001). This suggests French-speaking children with PLI do not make significantly more grammatical errors in their daily speech, perhaps because they avoid using forms they are not competent in; however, when probed for certain grammatical inflections, their lack of competence was evident. Avoiding forms they are not competent using is a strategy these children used

even when they were probed for certain grammatical inflections (Jakubowicz & Nash, 2001). For example, instead of saying “il a mangé la purée” (‘he ate the mashed potatoes’), a child was observed to say “la petite assiette elle est vide” (‘the little plate is empty’) (Jakubowicz & Nash, 2001, p. 330).

### **2.3 PLI in Highly Inflected Agglutinative Languages**

In agglutinative languages, words can also be segmented into distinct morphemes, where each morpheme always has a specific corresponding meaning (Pizzuto & Caselli, 1994). Turkish is a widely used example of an agglutinative language (e.g., Pizzuto & Caselli, 1994) whose characteristics will be described in more detail in the next section. Agglutinative languages can be divided into two categories: ones with relatively rich inflectional morphology (e.g., Hungarian, Persian, and Japanese) and ones with highly rich inflectional morphology (e.g., Korean and Turkish). Japanese, Korean and Turkish are considered to be related and they constitute the Altaic languages (Ager, 2016), a language family with over 400 million speakers (Lewis et al., 2016).

Hungarian children with PLI were found to make errors with tense and agreement markers on verbs (Lukács, Leonard, Kas & Pléh, 2009) as well as nominal case markers (Lukács, Kas, & Leonard, 2013). Children with PLI were significantly less accurate than vocabulary-matched TD children with the past tense, present tense, definite and indefinite conjugation, and person agreement markers. Interestingly, the increased errors Hungarian-speaking children with PLI made during elicited production tasks were not observed in narrative samples (Lukács, Kas & Leonard, 2013). Generally speaking, Hungarian-speaking children with PLI were more likely to make commission

errors than omission errors (Lukács, Leonard, Kas & Pléh, 2009; Lukács, Kas & Leonard, 2013) similar to Italian-speaking children with PLI but unlike English- and Arabic- speaking children with PLI who make more omission errors.

Research on Persian-speaking children with PLI has examined narrative samples only (Foroodi Nejad, 2011; Kazemi, Klee & Stringer, 2015). When compared to TD children matched for age, children with PLI were found to omit nominal plural inflections, verbal clitics (denoting object), progressive inflections, prepositions (Kazemi, Klee & Stringer, 2015) and nominal case markers (Foroodi Nejad, 2011), and to substitute verbal inflections with inappropriate ones (Kazemi, Klee & Stringer, 2015). Furthermore, the spontaneous speech samples from Japanese speakers have found limited differences between children with and without PLI (Ito, Fukuda & Fukuda, 2011). In contrast, elicited production tasks revealed significantly more errors with grammatical aspect (Ito, Fukuda & Fukuda, 2011), and with verbal morphology indicating passive or causatives (Fukuda & Fukuda, 2001).

Our sole insight into how language impairment manifests in Korean comes from a case study of a Korean-English bilingual child (Lee & Gorman, 2009). The child with PLI (a seven-year-old) was compared with an age-matched TD bilingual child, an MLU-matched TD bilingual child and an age-matched TD monolingual child. Out of the four case markers, the child with PLI performed similarly to the age-matched TD children on two case markers. His performance on the other two case markers was below the age-matched TD children's performance but was similar to the MLU-matched TD child's performance.

### 3. Turkish

#### 3.1 Turkish Language

As previously mentioned, Turkish is a highly inflected agglutinative language. Turkish has over twenty verbal inflections and eight nominal inflections (Taylan Erguvanlı, 2015). The verbal inflections consist of voice, negation, question, person agreement, tense, aspect, and modality markers, whereas the nominal inflections include case markers, plural suffix and possessive suffix (Taylan Erguvanlı, 2015). An example of the inflected verb “anlayabiliyorlarmıdır” (“to understand”) from the Turkish language appears in Figure 1. The utterance means ‘Do you think they are able to understand’. Since Turkish is a pro-drop language, the verb alone can carry the meaning of the utterance because the subject is marked on the verb with a suffix. The assumption of a null-subject utterance is that the people are generic, or that they have been previously referred to explicitly in discourse.

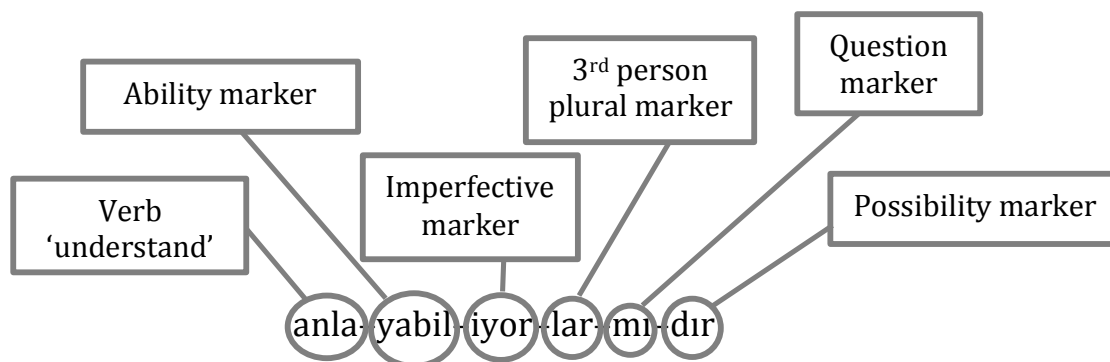


Figure 1. The breakdown of the inflectional suffixes on the verb “anlayabiliyorlarmıdır”

There is a set of phonotactic and phonological rules that govern how suffixes can be strung together (for a full review, see Taylan Erguvanlı, 2015). A rule that affects all

inflections is vowel harmony. The vowel of a suffix is modified so that it matches the frontness or the roundness of the last vowel of the word. In example (2) the last vowel of the word is [u] is high, back and round; therefore, the vowel of the suffix is also back and round.

- (2) bu-nu  
*this-ACC*

Sentence structure in Turkish follows subject-object-verb (SOV) order as a default (Göksel & Kerslake, 2005), as shown in Example (3). When the constituents of a sentence appear in non-SOV order, the meaning of the sentence is slightly changed to emphasize a specific constituent (Göksel & Kerslake, 2005). For example, the order of constituents in Example (4) is Object-Subject-Verb and here the stress is on “bunu” ‘this’, the material the students are trying to understand.

- (3) “Öğrenci-ler-im bu-nu anla-yabil-iyor-lar-mı-dır?”  
*student-PL-POSS this-ACC understand-ABIL-IMPERF-QUE-POSSIB-3<sup>rd</sup>PL*  
‘Do you think my students are able to understand this?’

- (4) “Bu-nu öğrenci-ler-im anla-yabil-iyor-lar-mı-dır?”  
*this-ACC student-PL-POSS understand-ABIL-IMPERF-QUE-POSSIB-3<sup>rd</sup>PL*  
‘Do you think my students are able to understand *this*?’ with a stress on ‘this’

### 3.2 Acquisition of Turkish

Turkish is highly inflected with a WALS rating of 6-7, more inflected than most of the languages discussed previously. The richness of its inflectional system has been linked to the early acquisition of grammatical markers in Turkish. Xanthos and colleagues (2011) investigated six languages, with a wide range of categories per word values from WALS, in order to find whether there was a correlation between the richness of a language’s inflectional system and the speed of morphological development in the speech of children. They found that the children speaking more

richly inflected languages began using inflections at an earlier age than languages that had a lower WALS value per word (i.e., sparsely inflected). They also found that overall, children produce verbal inflections before nominal inflections.

Studies of children's early acquisition of Turkish have primarily focused on their usage of nominal and verbal inflections. Early acquisition of verbal morphology has been reported in multiple studies. After around 18 months of age, Turkish children predominantly use two word utterances in Subject-Verb structure and start producing both nominal and verbal inflections (Ketrez, 1999). The uses of inflections are sparse until the age of two (Batman-Ratyosyan, 2003). Terziyan (2003) surveyed eight studies (Ekmekçi, 1982; Çapan, 1988; Acarlar & Dönmez, 1992; Dönmez & Arı, 1992; Güleriyüz & Dönmez, 1992; Aksu-Koç, 1998; Ketrez, 1999; Koyuncuoğlu, 2002) on the acquisition of verbal inflections in Turkish with various definitions of "acquisition". The definitions ranged from "used once" to "used with at least two different verbs". Terziyan compiled the following as the order of typical acquisition of tense-aspect-modality markers in Turkish presented in Table 3.

Table 3

*Order of acquisition of Turkish verbal inflections*

| <u>Stage</u> | <u>Suffix</u> | <u>Example</u>          |
|--------------|---------------|-------------------------|
| 1            | -DI           | "Ali ev-e gel-di."      |
|              | past tense    | Ali house-DAT come-PAST |
|              | marker        | 'Ali came home.'        |
|              | Ø             | "Ali ev-e gel."         |

---

|   |               |                             |
|---|---------------|-----------------------------|
|   | imperative    | Ali house-DAT come-Ø        |
|   | marker        | ‘Ali, come home!’           |
| 2 | -lyor         | “Ali ev-e        gel-iyor.” |
|   | imperfective  | Ali house-DAT come-IMPERF   |
|   | marker        | ‘Ali is coming home.’       |
| 3 | -AcAk         | “Ali ev-e        gel-ecek.” |
|   | future marker | Ali house-DAT come-FUT      |
|   |               | ‘Ali will come home.’       |

---



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| <u>Stage</u> | <u>Suffix</u> | <u>Example</u>             |
|--------------|---------------|----------------------------|
| 4            | -A            | “Ali ev-e        gel-e.”   |
|              | optative      | Ali house-DAT come-OPT     |
|              | marker        | ‘I want Ali to come home.’ |
|              | -mİş          | “Ali ev-e        gel-miş.” |
|              | evidential    | Ali house-DAT come-PAST    |
|              | marker        | ‘Ali must have come home.’ |
|              | -Ar/İr        | “Ali ev-e        gel-ir.”  |
|              | aorist marker | Ali house-DAT come-AOR     |
|              |               | ‘Ali may come home.’       |
| 5            | -sA           | “Ali ev-e        gel-se.”  |
|              | conditional   | Ali house-DAT come-COND    |

---

---

|   |               |                             |
|---|---------------|-----------------------------|
|   | marker        | 'I wish Ali to come home.'  |
| 6 | -mAll         | "Ali ev-e        gel-meli." |
|   | necessitative | Ali house-DAT come-NEC      |
|   | marker        | 'Ali must come home.'       |

---

Terziyan noted that Turkish children "acquire" most verbal inflections before age three and are proficiently using them before age five. Nominal inflections, which are few in number, are acquired before age two in the order represented below in Table 4 (Topbaş, 1997 as cited in Rothweiler, Chilla & Babur, 2010).



Table 4

*Order of acquisition of Turkish nominal inflections*

| <u>Stage</u> | <u>Suffix</u>       | <u>Example</u>  |
|--------------|---------------------|---|
| 1            | -A                  | “Ali ev-e gel-di.”                                    |
|              | Dative marker       | Ali house-DAT come-PAST<br>‘Ali came home.’           |
|              | -I                  | “Ali ev-i gör-dü.”                                    |
|              | Accusative marker   | Ali house-DAT see-PAST<br>‘Ali saw the house.’        |
| 2            | -In                 | “Ali-nin ev-i-ymiş.”                                  |
|              | Genitive marker     | Ali-GEN house-POSS-EVID<br>‘It was Ali’s home.’       |
| 3            | -DA                 | “Ali ev-de unut-tu.”                                  |
|              | Locative marker     | Ali house-LOC forget-PAST<br>‘Ali forgot it at home.’ |
| 4            | -Dan                | “Ali ev-den gel-di.”                                  |
|              | Ablative marker     | Ali house-ABL come-PAST<br>‘Ali came from home.’      |
| 5            | -(y)IA              | “Ali araba-yla gel-di.”                               |
|              | Instrumental marker | Ali car-INS come-PAST<br>‘Ali came with a car.’       |

Turkish-speaking children initially use the default word order (SOV) predominantly (Batman-Ratyosyan, 2003). Their mastery of the non-default word orders starts to be adult-like around age six (Batman-Ratyosyan, 2003).

### **3.3 PLI in Turkish**

The study of Turkish-speaking children with PLI is still in its infancy. Published studies on language disorders in Turkish-speaking populations have examined children with various forms of language impairment (PLI and language impairment due to another disorder/disability) living in Turkey (e.g., Acarlar & Johnston, 2011) or bilingual children with PLI living outside of Turkey (e.g., Rothweiler, Chilla & Babur, 2010). Below a few published studies on language disorders of Turkish-speaking children are outlined.

Acarlar and Johnston (2011) investigated the use of grammatical inflections by Turkish-speaking children with language impairments (PLI and language impairment due to another disorder/disability). With a mean age of 5;2, they were compared with age-matched TD children and MLU (in words) matched younger TD children. An analysis of their spontaneous language samples revealed that both groups of TD children were at ceiling (over 98%) in their accuracy in the production of nominal and verbal morphology. On the other hand, the accuracies (percent correct use of suffixes in obligatory contexts) of children with language impairment (LI) were 97.5% for verbal morphology and 85% for nominal morphology. The accuracies of children with LI were significantly lower than the TD children for both verbal and nominal morphology. Acarlar and Johnston analyzed the error patterns of nominal inflections – the errors on verbal inflections were too few to run differential analyses on – and found that more than 80%

of the errors were omission errors for all of the children (with and without LI). Moreover, the accuracy of children with LI's verbal morphology was significantly higher than nominal morphology. These findings may not generalize to all Turkish children with PLI because the LI children in this study included children with intellectual disabilities; however, the generally high levels of usage (85%) are impressive.

Duman and Topbaş (2016) explored the comprehension of the imperfective, past tense and future markers by children with and without PLI. They showed two pictures to children around the age of seven and asked them to point to the one that matched a target sentence. The pictures either showed an action taking place, a completed action or an action about to take place. They found that there was a significant difference between the performances of children with and without PLI. Moreover, they found that children with PLI performed lowest on the past tense sentences (61%), and highest on the imperfective sentences (82%). Their performance on the future sentences was between those (71%). Age- and nonverbal IQ- matched TD children were near ceiling in all conditions. Their performance on the imperfective sentences (95%) was significantly higher than their performance on the other sentences. Their performance on the past and future sentences (respectively 88% and 90%) did not significantly differ from each other. A possible limitation of their study was that the TD children around the age of 7 were not at ceiling. The experiment design was straight forward enough that TD children would be expected to be around 100% for all inflections. Since they are not, the low scores of children with PLI might be due to a confounding factor, which is also the reason the TD children are not at ceiling.

Rothweiler, Chilla and Babur (2010) investigated competence in nominal morphology, namely case markers, of Turkish-German bilinguals with and without PLI by analyzing spontaneous language samples. Their participants consisted of two language-impaired children (recorded at ages between 5;5-6;5), one age-matched TD child (recorded at ages between 5;5-6;5), and one younger TD child (recorded at ages between 2;5-3;1). They found that bilinguals with PLI made significantly more mistakes while using case morphology than their TD counterparts. However, their accuracy rates were still over 80%. Moreover, the late acquired nominal inflections, such as the instrumental marker, were absent in their speech samples with no occurrences of obligatory context for these inflections. They found that children with PLI make commission errors as well as omission errors even around age six, whereas TD children only made omission errors after age three. Limitations of their study's generalizability involved the small number of participants (n=2) and the fact that their participants were bilingual.

de Jong, Çavus and Baker (2010) investigated both nominal and verbal inflections in Turkish using elicited production tasks, grammaticality judgments and narrative samples gathered from Turkish-Dutch bilinguals (age range = 6-8 years). The accuracy of person agreement markers in elicited productions by TD children was at ceiling and by children with PLI with 89% accuracy. The differences between the two groups was found to be significant. The errors made by children with PLI were primarily commission errors, as shown in Example (5). In Example (5) the sentence was started by the experimenter and the participant concluded the sentence by saying the verb in the parenthesis.

- (5) “Afferin oğlu-m, sen güzel bir çiçek (kes-ti-m).”  
Well done son-POSS.1SG, you beautiful a flower (cut-PST-1SG)  
‘Well done, my son, you have cut a beautiful flower’  
(adapted from de Jong, Çavus & Baker, 2010)

Children with PLI made significantly more case marking errors in the narrative samples and used case markers in significantly fewer instances. Moreover, children with PLI performed significantly worse on the grammaticality judgments on nominal inflections.

From the limited work on this language, an interim conclusion is that Turkish-speaking children with PLI have difficulty with verbal and nominal inflections. However, the details of the difficulties require further investigation. That is to say, research on language disorders needs to be investigated further in Turkish-speaking monolingual children with primary language impairment. There still are over fifteen suffixes in Turkish that we do not know how children with PLI are able to comprehend or use. Learning more about how language disorders manifest itself in Turkish will not only help Turkish children get more accurately diagnosed but will also contribute to our knowledge base of PLI from a cross-linguistic perspective.

#### **4. Current Study**

Other than a select few languages, the information we have on language impairment is limited. Across languages grammatical inflections appear to be challenging for children with PLI speaking an inflected language. Both nominal and verbal morphology can be at risk for children with PLI. The deficits in the language of children with PLI were increased in elicited tasks, whereas they were less likely to be visible in these children’s conversational speech. Overall, children with PLI were observed to make both omission and commission errors. In languages such as English, children with PLI make omission errors, whereas in languages such as Hungarian and

Italian children with PLI make mostly commission errors. On the other hand, in other languages (e.g., Arabic) there is no clear preference of error type. Arabic-speaking children make mostly omission errors with verbal morphology but they make both omission and commission with nominal morphology.

The current study is preliminary work for two far-reaching goals. The first goal is to delve more deeply into the study of PLI in Turkish in order to add information to the cross-linguistic literature on PLI with the intention of extending our understanding of human cognition. The second goal is to develop a measure of language ability in order to diagnose Turkish children more efficiently, objectively and promptly. This goal is crucial for clinicians. Early identification of children with PLI is important for optimal outcomes of language development (Stanton-Chapman et al., 2002). Furthermore, it is well known that English-speaking children with language impairments are at risk for academic failure in comparison to their TD peers (e.g., Catts & Kamhi, 2015). Hence, the need to develop sensitive measures to diagnose PLI in Turkish is critical as these children may be at risk for academic failure as well.

From research conducted on other languages, and a few on Turkish, we suspect that Turkish-speaking children with PLI will have difficulty with the use of grammatical morphemes. Studies on French and Japanese suggest that examining elicited productions might be more illuminating than spontaneous speech samples (Jakubowicz & Nash, 2001; Ito, Fukuda & Fukuda, 2011). In addition, most standard assessments of language use elicitation tasks because they are relatively quick and easy to administer and score. de Jong, Çavus and Baker (2010) used an elicitation task in their study because it was easy for children to perform and gave the experimenters control over the

children's productions. They designed a carrier phrase style task where they introduced enough information for the children to produce a target verb (with its inflections). In the current study, later acquired verbal inflections were studied because cross-linguistic literature on children with PLI suggests these morphemes may be good prognostic indicators of language impairment. As previously mentioned, the default word order in Turkish is subject-object-verb and since Turkish is a "strongly suffixing" language (rather than prefixing) (Dryer & Haspelmath, 2013), the verbal inflections are produced at the end of a sentence. As previously discussed, children with PLI may compensate for their deficits by avoiding use of difficult grammatical morphemes in spontaneous speech. The elicitation design does not give the participant a chance to compensate for their deficits and therefore, is likely to be a successful format for revealing grammatical errors in Turkish-speaking children with PLI.

The verbal inflections targeted in the current study were: the aorist, the future, the evidential and the causative. These are not the verbal inflections acquired first, which are the past tense marker, the imperative and the imperfective marker as presented in Table 4. These markers are representative of Turkish inflections by the variety of characteristics they possess. Table 5 compares these markers on various linguistic qualities. Examples (6) to (9) illustrate the characteristics of these inflections.

- (6) a. "Çocuk anne-si-ni                      bez-dir-miş."  
       child mother-POSS-ACC tire-CAUS-EVID  
       'The child made her/his mother be fed up with her/him.'
- b. "Bulaşık makine-si-ni                      çalış-tır-ma-dı."  
       dish machine-POSS-ACC work-CAUS-NEG-PAST  
       'She/he did not start the dishwasher.'
- (7) a. "Kitab-ı              ver-ir-mi-sin?"  
       book-ACC give-AOR-QUE-2<sup>nd</sup> SING

'Would you give me this book?'

- b. "Bu saat-te ev-de ol-maz-lar.  
this hour-LOC house-LOC be-NEG\*AOR-3<sup>rd</sup> PLU  
'They would not be home at this hour.'

- (8) a. "Kek yarım saat-te piş-ecek."  
cake half hour-LOC cook-FUT  
'The cake will be baked in half an hour.'

- b. "Kitab-ım sen-de ol-acak."  
book-POSS you-LOC be-FUT  
'You should have my book.'

- (9) a. "Duy-du-n-mu, sevgili-sin-den ayrı-l-mış."  
hear-PAST-2<sup>nd</sup> SING lover-POSS-ABL separate-PASS-EVID  
'Did you hear that they broke up?'

- b. "Kapı kırık demek ev-e hırsız gir-miş."  
door broken thus house-DAT thief enter-EVID  
'Since the door is broken, a thief must have gotten in the house.'

The causative suffix, which denotes voice, has allomorphs as well as allophones and cannot be interchanged with another suffix. It is placed immediately after the verb before the tense-aspect-modality markers. The aorist, which can denote aspect or modality, has allomorphs as well as allophones and can be interchanged with another suffix in certain environments (e.g., with the imperative marker while requesting). It is placed in the fourth suffix slot after the verb following voice markers and before clitics. The future suffix, which can denote tense or modality, only has allophones and can be interchanged with another suffix in certain environments (e.g., with the imperfective marker for denoting tense if there is a time adverb in the sentence). It is placed in the fourth suffix slot after the verb following voice and negation markers, and before the clitics. The evidential suffix, which denotes tense, aspect and modality, only has



allophones and cannot be interchanged with another suffix. It is placed in the fourth suffix slot after the verb following voice and negation markers, and before the clitics.

Table 5

*Properties of the verbal inflections used in the current study*

|                                     | <u>The Causative</u> | <u>The Aorist</u> | <u>The Future</u> | <u>The Evidential</u> |
|-------------------------------------|----------------------|-------------------|-------------------|-----------------------|
| Morphophonological variations       | ✓                    | ✓                 | ×                 | ×                     |
| Interchangeable with another suffix | ×                    | ✓                 | ✓                 | ×                     |

---

|                                      |                 |                  |                 |                         |
|--------------------------------------|-----------------|------------------|-----------------|-------------------------|
| Being reduced during informal speech | ×               | ×                | ✓               | ×                       |
| Place of suffix after the verb       | 1 <sup>st</sup> | 4 <sup>th</sup>  | 4 <sup>th</sup> | 4 <sup>th</sup>         |
| Function                             | Voice           | Aspect, modality | Tense, modality | Tense, aspect, modality |

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All these characteristic of the inflections may be significant for PLI in Turkish. Allophones might be relevant because in Hebrew-speaking children with PLI were observed to substitute one pattern for past tense for another. Therefore, a finding of the current study could be that children might make errors in which allophones of a suffix are used. The place of order might be important because children with PLI have been found to delete or substitute non-final inflections more often in Hebrew and Italian (Leonard, 2000). This would suggest that the causative suffix might be more likely to be omitted or substituted. The quality of being interchangeable with another suffix may be important because studies from French-speaking children with PLI suggest that these children use forms they are comfortable with instead of the ones they might not mastered yet. The causative and evidential suffixes would not allow for compensation because they are not interchangeable but the aorist and the future suffixes would. The four suffixes of the current study were chosen in order to control for these characteristics that might influence their usage by children with PLI.

The future and the evidential suffixes are investigated more thoroughly than the causative and the aorist for two reasons. The first reason was in order to observe whether children with PLI would be as proficient with different functions of these suffixes. The second reason was that literature on Turkish verbal suffixes has been controversial. For example, Öztürk and Papafragou (2008) found that Turkish children acquired the evidential after 6 years of age, whereas Terziyan (2013) showed that the evidential is acquired before 3 years of age. This controversy might be due to the researchers investigating different functions of these suffixes. By investigating these suffixes more thoroughly, the probability of the participants' production of these suffixes was increased.

The first part of this study describes the design of our tasks, which are designed to elicit the target inflections, and the process of piloting it on adults and school aged children. The second part describes the modified stimuli as they were used for the younger children with and without PLI in order to investigate their performance on our tasks.

In Experiment 1, we hypothesized that the adult and the school-aged children would perform at ceiling for all tasks. This would demonstrate that the stimuli yielded the desired responses from expert language users. In Experiment 2, we hypothesized that the TD children would perform competently (above 80%) but not as proficiently as the school-aged children from Experiment 1 (not at ceiling) for all tasks. Our reasoning was that these are late acquired inflections with multiple meanings and therefore, younger TD children would not be “experts” at using these inflections yet. Moreover, we hypothesized that the performance of children with PLI would be significantly lower than

the performance of TD children on all tasks. On the errors children with PLI make, we hypothesized that they would make more errors than TD children and that they will make more commission errors than omission errors analogous to children with PLI speaking Italian because these languages are more similar to Turkish than English or Arabic whose speakers with PLI make more omission errors.

## **Experiment 1**

### **Method**

#### **Participants**

The participants for Experiment 1 lived in Istanbul, Turkey and were primary speakers of Turkish. They included 10 adults ( $M=26$  years,  $SD=1.6$  years) and 7 elementary school children ( $M=10$  years,  $SD=2.1$  years). The adults' ages ranged from 23 to 28 years old and all had completed an undergraduate or graduate degree. There were 9 females and 1 male. The elementary children's ages ranged from 7 to 12 years old. This group consisted of 6 females and 1 male. Turkish was confirmed as the native language of all participants; however, they were also exposed to another language either at home or at school. These languages included English, Armenian and French. The adult participants and the parents of child participants confirmed the absence of language, cognitive or hearing impairments through a personal interview.

#### **Materials**

Verbs were chosen as targets if they were present in longitudinal language acquisition data from two children. Our assumption was that if a verb were present in these children's speech, it would be present in the repertoire of children older than 5 years old. The longitudinal language acquisition data came from languages samples collected by Aksu-Koç between the years of 1994 and 1998 as a part of a larger research project. The two children were between ages 1;3-2;0 and 1;6-2;10 at the time of data collection. The list of target verbs is provided in the Appendix A.

Materials contained a 13-inch MacBook Pro, three stuffed toys and the scripts for six tasks, namely a causative task, an aorist task, two future tasks and two evidential tasks. The total number of items was 111 and these are listed in Appendix A. The tasks are described in detail below.

### ***The causative task***

The causative suffix has a single function, to add an agent who causes an event to occur, and the causative task evaluated this function. The causative task was adapted from Nakipoglu and colleagues (2012) and consisted of 24 items. The target verbs for the items were chosen so that the causative suffix required would be only a single allomorph (the default one) and an equal number of allophones would be elicited. There were 3 target verbs per allophone, namely -dır, -dir, -dur, -dür, -tır, -tir, -tur and -tür. For each item there were two pictures. In one picture, a character is doing something and in the other picture, a character is causing another character to do the same thing. Pictures from an example item for the causative task is presented Figure 2.



*Figure 2.* The pictures of the “wake-up” item from the causative task. The left picture depicts a girl waking up from sleep and the right picture depicts a cat waking a girl up from sleep.

### ***The aorist task***

The aorist has many functions including habitual aspect and predictions about the future (Taylan Erguvanlı, 2015). It is also used to make polite requests. The aorist task of our study evaluated the participant’s ability to use the aorist suffix to make polite requests.

The aorist task consisted of 29 items. Each item involved pictures depicting a problem and two characters. One of these characters was a child (a boy or a girl) and the other an adult. The title of the adult character was decided following a preliminary survey done with 74 adult Turkish speakers by the experimenter. These adults rated how polite their request would be if they wanted something from various relatives or authority figures. The group of relatives who received moderately polite rating was chosen as the titles of the adult characters in this task. These were “teyze” (‘aunt’), “hala” (‘aunt’), “amca” (‘uncle’), “dayı” (‘uncle’) and “anneanne” (‘grandmother’). The target verbs were determined to represent a variety of allomorphs and allophones of the aorist, namely -ar, -er, -ir, -ır, -ur and -ür. A picture from an example item is presented in Figure 3.



*Figure 3.* The picture of the “write” item from the aorist task depicting a child asking his aunt to write his name on a piece of paper.

### ***The future tense task***

The future tense task evaluated the participants’ use of the future marker to denote a future action or event. This task was inspired by Aksu-Koç (1988). The target verbs chosen were designed to elicit the two allophones of the future marker (i.e., -ecek and -acak) according to vowel harmony equally. There were 15 items. Each item involved moving pictures (i.e., gifs) in order to give them a sense of not having been completed. A static version of an example picture for an item is presented in Figure 4.



*Figure 4.* The picture of the “listen” item from the future tense task depicting a boy listening to music via headphones.



### ***The future conjecture task***

The future conjecture tasks evaluated the participants' use of future marker to make a prediction about the future that was highly likely to happen. This task was also inspired by Aksu-Koç (1988). The target verbs chosen were again designed to elicit the two allophones of the future marker (i.e., -ecek and -acak) according to vowel harmony equally. There were 13 items. Each item involved moving pictures (i.e., gifs) in order to give them a sense of not having been completed yet. A static version of an example picture for an item is presented in Figure 5.



*Figure 5.* The picture of the “snap” item from the future conjecture task depicting a rope about to snap.

### ***The evidential inference task***

The evidential tasks evaluated the participants' use of evidential marker to make inferences. This task was adapted from Aksu-Koç (1988). The target verbs in the task elicited an equal distribution of the allophones of the evidential morpheme, namely -mış, -miş, -muş and -müş. The evidential inference task consisted of 15 pictures, which

depicted an event already completed. In order to achieve a sense of completion in these items, static pictures were chosen (Aksu-Koç, 1988). An example item from the evidential inference task is provided in Figure 6.



*Figure 6.* The picture of the “break” item from the evidential inference task depicting a boy having broken a vase.

### ***The evidential hearsay task***

The evidential tasks evaluated the participants’ use of evidential marker to denote hearsay. This task was adapted from Aksu-Koç (1988). The target verbs in the evidential tasks elicited an equal distribution of the allophones of the evidential morpheme according to vowel harmony, namely -mış, -miş, -muş and -müş. The task involved three stuffed toys, presented in Figure 7, and was consisted of 15 items.



Figure 7. The stuffed toys used in the evidential hearsay task.

### **Procedure**

Participants completed the tasks individually in a quiet room, sitting at a table. The stimuli from the first five tasks were presented on a MacBook Pro. The sixth task was presented with real stuffed toy props. The order of the tasks was counterbalanced across participants. The scripts for all tasks are presented below.

### ***The causative task***

The script for each causative item consisted of a format where the experimenter pointed to the picture on the left and described the picture as in Example (10).

- (10) “Bur-da      kız uyan-ıyor”  
here-LOC girl wake-IMPERF  
‘Here, the girl is waking up.’

The participant was then asked to complete a sentence describing what was happening in the other picture. The expected target response can be found in (11).

- (11) “Bur-da      da kedi kız-ı      uyan-dır-ıyor”  
here-LOC also cat girl-ACC wake-CAUS-IMPERF  
‘And here the cat is waking the girl.’

If the participant did not respond, the experimenter started saying the sentence but left out the target verbal morphology in order to reduce the cognitive load for the participant as in Example (12).

- (12) “Bur-da      da    kedi kız-ı      uyan-”  
here-LOC also cat girl-ACC wake-  
‘And here the cat (wake) the girl.’

### ***The aorist task***

The script for each aorist item consisted of a format where the experimenter pointed to the picture, described it and asked a question to the participant about it as in Example (13).

- (13) “Bak bu Ali. Ali daha yazmasını bilmiyormuş. Halasının adını  
yazmasını istiyormuş. Ne desin halasına?”  
look this Ali Ali yet write-NOM-POSS-ACC know-NEG-IMPERF-EVID  
aunt-POSS-GEN name-POSS-ACC write-NOM-POSS-ACC  
want-IMPERF-EVID what say-OPT aunt-POSS-DAT  
‘This is Ali. He doesn’t know how to write yet. He wants his aunt to  
write his name down. What should he tell his aunt?’

The expected target response can be found in (14).

- (14) “Hala, ad-ım-ı yaz-ar-mı-sın?”  
aunt name-POSS-ACC write-AOR-QUE-2<sup>nd</sup> SING  
‘Aunt, may you write my name on here?’

If the participant did not respond, the experimenter started saying the sentence but left out the target verbal morphology in order to reduce the cognitive load for the participant as in Example (15).

- (15) “Hala, ad-ım-ı yaz-”  
aunt name-POSS-ACC write-  
‘Aunt, (may) you write my name on here’

### ***The future tense task***

The script for each future tense item consisted of a format where the experimenter pointed to the picture, described it as in Example (16). The experimenter ended her description without completing it and raised her intonation to suggest that the participant should complete it.

- (16) “Bu çocuk dün müzik dinledi. Şu anda müzik dinliyor. Yarın?”  
this child yesterday music listen-PAST this moment music  
listen-IMPERF tomorrow  
‘He listened to music yesterday. He is listening to music right now.  
Tomorrow?’

The expected target response can be found in (17).

- (17) “Müzik dinli-yecek.”  
music listen-FUT  
‘He will listen music.’

If the participant did not respond, the experimenter started saying the sentence but left out the target verbal morphology in order to reduce the cognitive load for the participant as in Example (18).

- (18) “Müzik dinli-.”  
music listen-  
‘He (will) listen music.’

### ***The future conjecture task***

The script for each future conjecture item consisted of a format where the experimenter pointed to the picture, described it as in Example (19). The experimenter ended the description without completing it and use a raised intonation to suggest that the participant should complete it.

- (19) “Bak, bu ip kop-ma-ya başla-mış. Biraz-dan?”

look this rope snap-NOM-DAT start-EVID soon-ABL  
'Look, this rope has started to snap. Soon?'

The expected target response can be found in (20).

(20) "Kop-acak."  
snap-FUT  
'It will snap.'

If the participant did not respond, the experimenter started saying the sentence but left out the target verbal morphology in order to reduce the cognitive load for the participant as in Example (21).

(21) "Kop-."  
snap-  
'It (will) snap.'

### ***The evidential inference task***

The script for each evidential inference item consisted of a format where the experimenter pointed to the picture and asked a question to the participant about it as in Example (22).

(22) "Ne olu-yor bu resim-de? Vazo niye yer-de kırık bir şekil-de"  
what happen-IMPERF this picture-LOC vase why floor-LOC broken one  
state-LOC  
'What is going on this picture? Why is this the vase on the floor and broken?'

The expected target response can be found in (23).

(23) "Çocuk vazo-yu kır-mış."  
child vase-ACC break-EVID  
'The child must have broken the vase?'

If the participant did not respond, the experimenter started saying the sentence but left out the target verbal morphology in order to reduce the cognitive load for the participant as in Example (31).

(24) "Çocuk vazo-yu kır-."

child vase-ACC break-  
'The child (must have broken) the vase?'

If the participants used the past tense marker instead of the evidential marker, they were asked whether they saw the action take place. No matter the participants' answers, they were told "No we didn't." and were provided with the correct answer. Each item was presented in a similar fashion.

### ***The evidential hearsay task***

The experimenter set up the evidential hearsay task by saying something along the lines of Example (25).

- (25) "Şimdi bu şirin-ler-le bir oyun oyna-yacağ-ız. Ben-im şirin-im sen-in şirin-in-e geçen haftasonu ne yap-tığ-ın-ı anlat-acak. Sonra sen-in şirin-in de bu-nu Şirinbaba-ya anlat-acak."  
now this smurf-PLU-INS one game play-FUT-1<sup>st</sup> PLU I-GEN smurf-POSS you-GEN smurf-POSS-DAT last weekend what do-NOM-POSS-ACC tell-FUT then you-GEN smurf-POSS also his-ACC papa smurf-DAT tell-FUT  
'Now we are going to play a game with puppet. My Smurf will tell your Smurf what he/she did last weekend. Then your Smurf will retell this to Papa Smurf.'

Each sentence (e.g. Example (26)) was told and retold individually.

- (26) "Bisiklet-e bin-di-m"  
bicycle-DAT ride-PAST-1<sup>st</sup> SING  
'I rode a bicycle'

The expected target response can be found in (27).

- (27) "Bisiklet-e bin-miş"  
bicycle-DAT ride-EVID  
'He rode a bicycle'

If the participant remained silent, the Papa Smurf, voiced by the experimenter, said Example (28).

- (28) "Arkadaş-ın san-a ne dedi? Ne yap-mış geçen haftasonu?"  
friend-POSS you-DAT what say-PAST what do-EVID last weekend  
'What did your friend tell you? Do you know what he/she did last weekend?'

If the participant continued to remain silent, the experimenter started saying the sentence but left out the target verbal morphology in order to reduce the cognitive load for the participant as in Example (29).

- (29) “Bisiklet-e bin-”  
bicycle-DAT ride-  
‘He (rode) a bicycle’

### **Coding**

The responses of the participants were scored in two manners: 1) the response was correct or incorrect (see Examples 34 & 35) regardless of whether that targeted verbal morphology was used or 2) the response was only scored correct if the target verbal suffix was used. Mean percentage of correct answers refers to the responses provided by the participants that were appropriate ones even if they were not the target responses divided by the total number of items for a particular task. Mean percentage of correct answers with the target suffix refers to the answers provided by the participants that were target responses divided by the total number of items for a particular task. This differentiation was not a significant one for the causative and evidential markers seeing that there were no other verbal inflections in Turkish that might replace these markers. On the other hand, this differentiation was significant for the aorist and future markers. Examples (30) and (31) are responses from participants that were coded as “correct answer” and “correct answer with the target suffix” for the aorist and future markers respectively.

- (30) “topla-r-mi-sin?”  
tidy-AOR-QUE-2<sup>nd</sup> SING  
‘Would you tidy it up?’

- (31) “tırman-acak.”



climb-FUT  
'He/She will climb.'

Examples (32) and (32) are responses from participants that were coded as “correct answer” but not “correct answer with the target suffix” for the aorist and future markers respectively.

(32) “topla-sa-na?”  
tidy-OPT-2<sup>nd</sup> SING  
'Would you tidy it up?’

(33) “tirman-ir.”  
climb-AOR  
'He/She might climb.'

## Results

The results for each group (adults and school-aged children) are presented in Table 6 and 7.

Table 6

*Adult participants' mean percent correct scores on the six tasks*

|            |            | <u>Mean Percent Correct (SD)</u> | <u>Mean Percent Correct with<br/>the Target Suffix (SD)</u> |
|------------|------------|----------------------------------|---|
| Causative  |            | 96 (4)                           | 96 (4)  |
| Aorist     |            | 100 (0)                          | 69 (31)   |
| Future     | Tense      | 100 (0)                          | 100 (0)   |
|            | Conjecture | 95 (6)                           | 88 (14)   |
| Evidential | Inference  | 91 (11)                          | 91 (11)   |
|            | Hearsay    | 100 (0)                          | 100 (0)   |

Table 7

*School-aged children participants' mean percent correct scores on the six tasks*

|            |            | <u>Mean Percent Correct (SD)</u> | <u>Mean Percent Correct with<br/>the Target Suffix (SD)</u> |
|------------|------------|----------------------------------|---|
| Causative  |            | 95 (5)                           | 95 (5)  |
| Aorist     |            | 100 (0)                          | 83 (37)   |
| Future     | Tense      | 99 (3)                           | 99 (3)  |
|            | Conjecture | 97 (4)                           | 92 (8)  |
| Evidential | Inference  | 94 (12)                          | 94 (12)   |
|            | Hearsay    | 98 (3)                           | 98 (3)  |

As can be observed from Tables 6 and 7, both groups were near ceiling on the percentage of correct answers. This is also the case with percentage of correct answers with the target suffix except for one task. The exception is the aorist task. These adults were more likely to use the polite request forms but occasionally used other forms as well, such as informal requests (-A, the optative suffix) or overly polite request forms (-Abil, the ability suffix). The children also sometimes used these other forms.

The overall percent correct scores of the adult participants ranged from 94% to 100%. The overall percent correct scores of the child participants also ranged from 94% to 100%. The overall mean percent correct for both groups were compared in order to find whether there was a difference between the overall scores of the groups. Due to

the non-normative nature of the scores, a Mann-Whitney *U*-test was conducted. There was no significant difference between the adults and the children ( $U = 35$ ,  $p\text{-value} > .05$ ).

An item analysis was conducted to investigate why the scores were not 100% across the board. A review of participants' comments for specific items revealed that some items were confusing for the participants. The problematic items were five causative items ('cut', 'share', 'slide', 'get angry', and 'fit'), three aorist items ('stop', 'close' and 'dry'), two future conjecture items ('squeeze' and 'get wet') and four evidential inference items ('paint', 'eat', 'knock down' and 'swallow').

## **Discussion**

We hypothesized that the adult and the school-aged children in Experiment 1 would perform at ceiling for all tasks. This hypothesis was mostly correct and all of the participants provided correct responses with at least 91% accuracy in all the tasks. We found that the reason behind the participants performing near ceiling rather than at ceiling was due to some of the materials created to elicit the target items. These materials were removed from test items for the second experiment. We also found in Experiment 1 that the design of tasks was successful in eliciting the specific inflection that was targeted. In other words, the participants did not use other inflections instead of the target ones. There was one task, which was an exception. The aorist task did not always elicit the aorist suffix. The adult participants occasionally used either more formal or informal forms than polite requests (31% of the test items). However, this pattern was not seen in the child participants, who almost always used the aorist to denote polite requests.

These results suggested that the tasks developed in Experiment 1 could be used as effective tools to test children's inflection skills. However, these tasks needed to be modified to increase their accuracy in eliciting the target items. Experiment 2 was designed to test younger children's use of grammatical inflections. The participants in Experiment 2 were composed of children with and without PLI in order to determine whether there would be differences between the two groups.

## Experiment 2

### Method

#### Participants

The participants for Experiment 2 were recruited from preschools as well as speech and language clinics in Istanbul. From preschools, 15 TD children were recruited. There were 5 females and 10 males. The TD children were between the ages 5;1-6;6 (Mean=5;11 SD=5 months). No standardized measures were completed for any of the TD groups. However, the absence of a language, cognitive and hearing impairment was confirmed by the parents or teachers.

Nine children with primary language impairments (PLI) were recruited from a variety of speech and language clinics. There were 2 females and 7 males. Their ages ranged from 5;0 to 6;7 (M=5;10, SD=7 months). All of them were identified by local speech-language pathologists as having a language impairment, but also having a negative history of hearing, intellectual or speech sound impairments. They were on active caseloads and receiving language intervention at the time of the study. Since the children had received standardized testing within a year of recruitment, no further testing for inclusion in the study was completed. The data for one child with PLI could not be included in this study because of noncompliance with the experimental tasks. Therefore, only data from eight children were included in this study. This child, whose data was removed, was 5 years of age.

## Materials

The materials were identical to the materials in Experiment 1 except for changes in a small number of items. Moreover, the items per task were divided into scored items and practice items. As previously mentioned, there were five problematic causative items, three problematic aorist items, two problematic future conjecture items and four evidential inference items. Two of the problematic causative items were administered but re-categorized as practice items, the picture of a third problem item was changed in order to be clear for the participants and the last two were removed from the task. The three problematic aorist items were administered but re-categorized as practice items. The pictures from two problematic items of the future conjecture task were changed. Two of the problematic evidential inference items were administered but re-categorized as practice and the pictures from the other two problematic items were changed. The list of practice and target items for the tasks is provided in Appendix B.

The problematic causative item that was altered was 'cut'. The new pair of pictures for the 'cut' item is presented in Figure 8.



*Figure 8.* The new pair of pictures of the 'cut' item from the causative task depicting a girl cutting her hair and a girl getting her hair cut.

The pictured of the 'squeeze' and the 'get wet' items from the future conjecture task were altered. The new pictures for these items are respectively presented in Figures 9 and 10.



*Figure 9.* The new picture of the “squeeze” item from the future conjecture task depicting a woman chopping lettuce next to lemons and a citrus juicer.



*Figure 10.* The new picture of the “get wet” item from the future conjecture task depicting a dog sleeping and a glass of juice about to spill over it.



The pictures of the 'paint' and 'eat' items from the evidential inference task were altered. The handprints on the wall in the 'paint' item were colored purple to resemble paint because the participants of Experiment 1 associated the black handprints with dirt. This slightly modified version is presented in Figure 11. Additionally, a new picture was chosen for the 'eat' item, which is presented in Figure 12.



*Figure 11.* The new picture of the “paint” item from the evidential inference task depicting a child with paint on his hand and handprints on the wall.



*Figure 12.* The new picture of the “eat” item from the evidential inference task depicting a child feeling full and a mostly eaten cake.

## **Procedure**

Participants completed the tasks individually over an average of 45 minutes and the order of the tasks presented was counterbalanced across participants. The procedure was identical to the procedure of Experiment 1 except that the causative task, the aorist task and the evidential inference task included practice items, which were presented before the target items. In the causative task, two items ('share' and 'get angry') were presented as practice items. In the aorist task, three items ('stop', 'dry' and 'close') were presented as practice items. In the evidential inference task, two items ('knock down' and 'swallow') were presented as practice items. For the practice items, the experimenter gave the regular directions for that task and then provided the target responses to prime the participants for the expected response. When the children provided the target suffix, they were told that their answer was a good one. When the children provided an answer without the target suffix, they were told there was another answer they could give. Then they were told the target answer and asked to give answers like the target one. If the child answered two consecutive practice items correct, the rest of the practice items were skipped. Otherwise, all of the practice items were provided. After the practice items, the rest of the items were presented in the same fashion as Experiment 1.

## **Coding**

Responses were again recorded and transcribed. First, the Percent Consonant Correct (PCC: Bleile, 2004) was calculated for each participant. According to Bleile (2004) a PCC is calculated by dividing the total number of correct consonants by the total number of intended consonant multiplied by 100. This was done in order to

compare the two groups on their phonological accuracy. There was no consistency among the number of utterances provided by the participants seeing that some children were very talkative while others only would provide the verb as their answer. In order to keep the PCC calculations consistent among the participants, the PCC was calculated on the verbs the participants provided as their answers.

Second, the participants' target suffix accuracy was coded for all of the tasks. This was done so by coding the presence or the absence of the target suffix. Third, the responses to the aorist and the future tasks were coded as correct or incorrect regardless of whether that targeted verbal morphology was used as was done in Experiment 1. Fourth, the errors were categorized as omission versus commission errors.

Fifth, the participants were categorized as "competent" on a suffix or "not competent". We chose 80% accuracy in using a target suffix correctly as a marker of competency because in the field of speech-language pathology that is the standard. For example, above 80% can be referred to as "acceptable accuracy" (Paul & Norbury, 2012, p419) or "successful rates" (Mirenda, 2003, p207).

## **Results**

### **Phonological Accuracy**

The mean PCC for the TD children was 99.6% (SD 0.34) and the mean PCC for the children with PLI was 94.1% (SD 3.96). None of the children received a PCC score that was indicative of a speech sound disorder, which are disorders where children pronounce words incorrectly past the expected ages (Bleile, 2004). However, a t-test revealed that the difference between the mean PCC of the groups was significant

( $t(21) = -5.467$ ,  $p < 0.001$ , Hedges'  $g = 2.397$ ). In other words, children with PLI produced fewer consonants correctly in comparison to the TD children.

Most commonly, children with PLI produced errors of velar fronting and final consonant deletion, which are respectively presented in Examples (34) and (35). Velar fronting involves producing velar consonants as alveolars, and final consonant deletion involves omitting the last sounds from words if they are consonants. Other errors occasionally made are provided in Examples (36) through (37). Initial consonant deletion involves omitting the first sound from words if they are consonants and final syllable deletion involves omitting the final syllable of a word. The phonological errors did not in general interfere with the goal of the current study because the target suffixes were still recognizable even if slightly distorted at times.

(34) Velar fronting: “\*dülcet” instead of “gülcek”  
laugh-FUT  
‘He/she will laugh’

(35) Final consonant deletion: “\*ıslanica” instead of “ıslanacak”  
get wet-FUT  
‘He/she will get wet’

(36) Initial consonant deletion: “\*üpür” instead of “süpür”  
vacuum  
‘Vacuum it!’

(37) Final syllable deletion: “\*güldürü” instead of “güldürüyor”  
laugh-CAUS-IMPERF  
‘He/she is making him/her laugh’

### **Target Suffix Accuracy**

The mean scores (of the percentages, not the raw scores) for both groups per task are presented in Table 8. The percentage of target suffix use was calculated by dividing the number of answers that use the target suffix in a task divided by the total

number of answers in that task. The mean scores per task were calculated by taking the average of the participants for each task. On all tasks, the TD children received higher scores than the children with PLI; however, the strength of group differences varied by task. The TD children and children with PLI performed significantly differently on the causative task ( $t(21)^2 = -5.621$ ,  $p < .001$ , Hedges'  $g = 2.846$ ), on the aorist task ( $t(21) = -3.814$ ,  $p = .001$ , Hedges'  $g = 1.534$ ), on the future tense task ( $t(21) = -2.431$ ,  $p = .028$ , Hedges'  $g = 1.057$ ), on the future conjecture task ( $t(21) = -3.643$ ,  $p = .004$ , Hedges'  $g = 1.784$ ) and on the evidential inference task ( $t(21) = -2.876$ ,  $p = .016$ , Hedges'  $g = 1.425$ ). The scores of TD children and children with PLI were not significantly different on the evidential hearsay task ( $t(21) = -1.199$ ,  $p = .249$ , Hedges'  $g = 0.513$ ); however, note that the means of both groups were below 50%.

Table 8

*Mean percentage of target suffix accuracy of PLI and TD children and the significance of the group comparisons.*

|  | <u>PLI (SD)</u> | <u>TD (SD)</u> | <u>p-value</u> |
|--|-----------------|----------------|----------------|
|  |                 |                |                |

<sup>2</sup> The t-tests were interpreted with equal variances not assumed because the sample size was very small. For ease of comprehension, conventional degrees of freedom are reported here; however, t and p value reported are with equal variances not assumed.

|            |            |               |               |       |
|------------|------------|---------------|---------------|-------|
| Causative  |            | 21.88 (30.35) | 88.00 (18.69) | <.001 |
| Aorist     |            | 11.54 (32.64) | 72.56 (42.92) | .001  |
| Future     | Tense      | 34.17 (38.62) | 75.56 (39.41) | .028  |
|            | Conjecture | 30.77 (35.13) | 81.54 (24.46) | .004  |
| Evidential | Inference  | 26.92 (41.93) | 74.36 (27.99) | .016  |
|            | Hearsay    | 25.00 (44.33) | 48.44 (47.17) | .256  |

### Competency Level

As can be observed from the standard deviations on Table 8, there was a wide range of scores. The number of children who performed above competency levels was assessed in order to investigate whether there were outliers in each group (i.e., TD children scoring below competency level and PLI children scoring above competency level), which is presented in Table 9. There were one or two children who were outliers in the PLI group, which consisted of 8 children. There were some TD children who were below competency levels; however, most of the TD group (consisting of 15 children) was above competency levels.

Table 9

*Number of children who are above competency level per group and percent of group that is above competency level*

|  | PLI (%) | TD (%) |
|--|---------|--------|
|  |         |        |

|            |            |         |        |
|------------|------------|---------|--------|
| Causative  |            | 1(12.5) | 11(73) |
| Aorist     |            | 1(12.5) | 10(67) |
| Future     | Tense      | 2(25)   | 11(73) |
|            | Conjecture | 1(12.5) | 11(73) |
| Evidential | Inference  | 2(25)   | 7(47)  |
|            | Hearsay    | 2(25)   | 8(53)  |

### **Correct Answer Accuracy Regardless of the Type of Suffix**

Three of the tasks were also analyzed in a different manner using the percent of correct measures. The means for these analyses are presented in Table 10. Overall, children received very high scores on the aorist task and there was no difference between the groups ( $t(21) = -.521$ ,  $p = .609$ , Hedges'  $g = 0.214$ ). The answers considered "correct" for the aorist task included the optative suffix, the ability suffix, the aorist suffix and the imperative form of the verb. The answers considered "correct" for the future tasks included the future suffix, the imperfective suffix and the aorist suffix. The scores of TD children and children with PLI were significantly different on the future tense task ( $t(21) = -2.649$ ,  $p = .026$ , Hedges'  $g = 1.387$ ). The scores of TD children and children with PLI were also significantly different on the future conjecture task ( $t(21) = -3.961$ ,  $p = .002$ , Hedges'  $g = 1.929$ ).

Table 10

*Mean percent accuracy of PLI and TD children on the aorist and future tasks and the significance of the group comparisons*

|        |            | PLI (SD)      | TD (SD)       | p-value |
|--------|------------|---------------|---------------|---------|
| Aorist |            | 90.38 (16.06) | 94.36 (19.77) | .609    |
| Future | Tense      | 45.00 (48.04) | 93.33 (25.82) | .026    |
|        | Conjecture | 30.77 (35.13) | 86.15 (24.88) | .002    |

### Error Analysis

The types of errors (i.e., incorrect answers) were categorized into omission and commission errors. If a suffix was simply omitted, it was categorized as an omission error. On the other hand, if a suffix was substituted with another (incorrect/inappropriate) suffix, it was categorized as a commission error. Instances of omission and commission errors are provided in Examples (38) and (39) respectively.

(38) Target Answer: “kes-tir-ti.”  
                             cut-CAUS-PAST  
                             ‘He/she got it cut.’  
   A Participant’s Answer: “\*kes-ti.”  
                                     cut-PAST  
                                     ‘\*He/she got it cut.’

(39) Target Answer: “gül-ecek”  
                             laugh-FUT  
                             ‘He/she will laugh.’  
   A Participant’s Answer: “\*gül-dü”  
                                     laugh-PAST  
                                     ‘\*He/she will laugh.’



All of the children with PLI made both types of errors. Two TD children made no errors. Three TD children made commission errors but no omission errors. The rest of the TD children (ten) made both kinds of errors. Table 11 presents the mean percentages for each type of error per group. The number of items the participants answered were not the same across the board due to the participants occasionally providing no response to items. Therefore, the errors were converted into percentages (i.e., what percent of the total answers were omission errors and what percent of the total answers were commission errors) and non-parametric analyses were conducted. Wilcoxon signed-ranks tests revealed that the number of commission and omission errors made by TD children were significantly different ( $p$ -value = .01), whereas the number of commission and omission errors made by children with PLI were not significantly different ( $p$ -value > .05). Mann-Whitney  $U$ -tests revealed that there was a significant difference between TD children and children with PLI on omission errors ( $p$ -value = .01). However, there was not a difference between TD children and children with PLI on commission errors ( $p$ -value > .05).

Table 11

*Mean percentages of omission and commission errors made by all TD and PLI children.*

|            | <u>PLI (SD)</u> | <u>TD (SD)</u> |
|------------|-----------------|----------------|
| Omission   | 24 (20)         | 3 (4)          |
| Commission | 22 (17)         | 8 (7)          |

The type of errors made by TD and PLI were also analyzed with regards to competency levels. In Table 12 below, the mean percentages of omission and commission errors made by TD children whose performances were below competency levels and PLI children whose performances were above competency levels are provided. The purpose of this analysis was to compare the children above and below the competency level (80%) per group. The children with PLI who scored above and below competency levels were compared in terms of the types of errors they made. The number of children with PLI who performed above competency levels was too few to run a statistical analysis; however, the numbers of each type of error were very close to one and another. The children with PLI who scored above the competency level did not perform similar to the TD children but they performed similar to the children with PLI who scored below competency level. The TD children who scored below competency level were compared to TD children who scored above the competency level. A Wilcoxon signed-ranks test revealed that the TD children who scored below competency level performed similar to the TD overall and made significantly more commission errors than omission errors (T-value = 5, p-value = 0.05).

Table 12

*Mean percentages of omission and commission errors made by TD children below competency levels and PLI children above competency levels.*

|            | PLI (SD) | TD (SD) |
|------------|----------|---------|
| Omission   | 5 (1)    | 4 (6)   |
| Commission | 7 (5)    | 12 (6)  |

## Discussion

For Experiment 2, some materials were changed due to comments from the participants in Experiment 1. Moreover, the design was modified slightly to include practice items. These changes were made so that the tasks would be able to distinguish a person's ability with these suffixes and a person who can competently use these suffixes would not receive a low score due to faulty material. We hypothesized that the TD children in Experiment 2, who are younger than the child participants in Experiment 1, would perform competently (above 80%) but not as proficiently as the school-aged children from Experiment 1 (not at ceiling) for all tasks. We expected them to perform competently because they were quite older than three years of age, which is when these suffixes are acquired (Terziyan, 2013). On the other hand, we did not expect these children to be at ceiling because the suffixes investigated in the current study were later acquired inflections, and they had multiple meanings and functions.

The younger TD children of Experiment 2 performed as highly as we expected for four of the tasks. Their overall performance on the causative task, the aorist task, the future tense task and the future conjecture suffix was above competency levels (80%), even if there were some TD children performed below the competency levels. However, on the evidential hearsay and inference tasks their accuracies were lower than the competency level – their performance on the evidential inference task was almost at the competence level but not quite. This does not suggest, however, that these children were not competent users of the evidential suffix. Instead, I suggest that these children were not competent users of *these functions* of the evidential suffix. If the new information and narrative functions of the evidential suffix were tested, which are the

initial uses of the evidential suffix (Terziyan, 2013), then their performance would probably be higher. Overall, the younger TD children demonstrated good abilities to use the target suffixes.

The second hypothesis of Experiment 2 was that the performance of children with PLI would be significantly lower than the performance of TD children on all tasks. This hypothesis held true for all conditions except two. One exception was the evidential hearsay condition. The accuracies of both groups were below 50% (25% for children with PLI and 48% for TD children. Since older children in Experiment 1 received a score of 98% and nothing on this task was changed, the low performance of the younger children (with and without PLI) must be due to their age and levels of metalinguistic ability. There are two possibilities related to their age: (1) They have not mastered this function of the evidential suffix yet. (2) The design of this task, which was distinct from the other tasks, might have been too complicated for the younger children to comprehend.

The other condition without a difference between the groups was the percentage of correct answers on the aorist task. The use of the aorist suffix by the groups was significantly different; however, both groups were equally likely to provide a correct response. The accuracies of the groups were over 90% for providing a correct response. The responses provided by the participants in Experiment 2 was analogous to ones provided in Experiment 1 by older TD children and adults in that they contained alternative forms such as the overly formal ability suffix, the informal optative suffix or the borderline rude imperative. However, the imperative inflection is the bare verb. This might be coloring the results because it might be that the children with PLI are omitting

the aorist suffix but their answer still looks correct because the imperative form of the verb is a correct response. On the other hand, this is not highly likely because these children do not have many other instances where they produced bare verbs. Therefore, the use of imperative suffix over the aorist in this task suggests that the children with PLI opt to use a form they are more comfortable with. This is pattern of children with PLI compensating for their deficits can also be seen in studies done on children with PLI speaking other languages such as French or Hungarian (Jakubowicz & Nash, 2001; Lukács, Kas & Leonard, 2013).

The results suggest that there is a difference between the groups' performances because children with PLI made significantly more errors (in all tasks except the evidential hearsay). The third and fourth hypotheses of Experiment 2 were on the nature of these errors. We hypothesized that children with PLI will make more omission and commission errors than TD children and we hypothesized that children with PLI will make more commission errors than omission errors. Our hypotheses were not supported. We found that TD children made very few omission errors but made significantly more commission errors. On the other hand, children with PLI made similar numbers omission and commission errors, and significantly more omission errors than TD children. This suggests that TD Turkish children are more likely to make commission errors, whereas Turkish children with PLI make expected commission errors and unexpected (i.e., deviant) omission errors. The pattern of errors in Turkish might be useful in diagnosing PLI because even TD children who performed below competency levels did not have the same error pattern as children with PLI. This indicates that

making as many omission errors as commission errors is not a developmental stage but a deviance from the norm; therefore, such a pattern can be used as a sign of PLI.

An equal number of commission and omission errors by children with PLI is a pattern also found in Hebrew (Leonard et al., 2000). On the other hand, in English, children with PLI mostly make omission errors. One might assume that the richness of inflections might be responsible for such a pattern. Children with PLI speaking poorly inflected languages make mostly omission errors, whereas children with PLI speaking highly inflected languages make an equal number of commission and omission errors. However, this is not the case seeing that children with PLI speaking Arabic, which is also a highly inflected language, make mostly omission errors analogous to English-speaking children with PLI. Additionally, children with PLI speaking Italian and Hungarian (both highly inflected languages) make mostly commission errors. In short, findings from highly inflected languages reveal contradictory results on the subject of type of error.

In addition to analyzing the findings according to hypotheses, the results were also examined to reveal the phonological skills of the children. We found that the percentage of the consonants produced by children with PLI was 94%, while TD children were at ceiling. 94% is above previously mentioned competency levels used in the field of speech-language pathology; however, it was still significantly lower than the percentage of the consonants produced by TD children. This result is not surprising considering Leonard (2000) made the observation that English-speaking children with PLI were below expected norms on all areas of language even though other areas were not as deficient as morphosyntactic skills. Ramus and colleagues (2013) found that 77%

of the English-speaking children with PLI in their study has some form of phonological deficits. Phonological deficits of children with PLI speaking other languages have also been affirmed (e.g., French, see Maillart & Parisse, 2006). The significant differences in PCC in the current study do not influence the results for two reasons. One, the difference is very small even if significant – children with PLI produce a consonant correctly 94% of the time with a range of 86.3% to 97.9%. Two, the suffixes studied were consistent of at least two phonemes and the instances of more than a single sound deletion, distortion or substitution were rare.

## **General Discussion**

The purpose of this study was to investigate verbal inflections that could be used to identify PLI in Turkish speakers. In order to do so, we developed elicited production tasks, which would reveal one's competency in using these inflections. We chose to utilize elicited productions instead of spontaneous speech samples because spontaneous speech samples can underestimate (Eisenberg, 1997) or overestimate children's morphosyntactic skills (Jakubowicz & Nash, 2001; Ito, Fukuda & Fukuda, 2011).

The four verbal inflections in the current study were chosen for their acquisition patterns and morphosyntactic characteristics. These inflections are not acquired initially, which might have an influence on the competency of children with PLI. Early-acquired inflections may be more easily mastered than later-acquired inflections. Moreover, these suffixes were usually not word final and they consisted of at least two phonemes. They also had multiple functions/meanings, which may be hard to understand for children with PLI.

Five of the six tasks developed in the current study were effective in finding a significant difference between children with PLI and TD children. Moreover, the pattern of error was significantly different for these two groups of children regardless of their performance in the tasks. Children with PLI, even the ones performed above competency levels, made analogous numbers of omission and commission errors. On the other hand, TD children made mostly commission errors and this was also the case for TD children who performed below competency levels. These results suggest that the



tasks developed in the current study might be useful in screening for or diagnosing PLI in Turkish.

The need for a standardized measure of PLI in Turkish is currently met by Turkish versions of Test of Early Language Development-3 (Hresko, Reid, & Hammill, 1999) and TOLD:I-4 (Hammill & Newcomer, 2008). They have been adapted by Güven and Topbaş (2004). However, these tests are inherently based on English, a language that is very different from Turkish. Therefore, we believe a test originated from the unique characteristic of Turkish is crucial for effective diagnosis and treatment of PLI in Turkish.

## **Limitations**

The current study has laid down the groundwork for a larger research project. The number of participants in the two experiments is low and might affect the generalizability of the study. Another issue is that, the children with PLI are on the more severe side of the spectrum. The PLI research in other languages has revealed that the performances of children with PLI are significantly lower than TD peers but they are not as low as the Turkish children with PLI appear to be in the current study. This might be due to the fact that there are no sensitive measures in Turkish for identifying PLI; therefore, children with milder PLI might not be getting identified. This is one of the motivations of the current study: to develop a sensitive measure in Turkish for identifying PLI.

While focusing on verbal inflections, the current study did not attend to nominal inflections. Children with PLI speaking Hebrew, Persian and Korean have difficulties with case markers and since Turkish is a similar language, it can be conjectured that

case markers will also be problematic for Turkish-speaking children with PLI. Turkish-speaking TD children begin to show an understanding of the case markers around age 3 (Candan, 2009) and demonstrate competent use of case markers around age 4 (Özge, Küntay & Snedeker, 2016); therefore, any deficits a Turkish-speaking child older than 5 years old might have on the use of case markers might be an indication of PLI.

## **Conclusions**

The current study has revealed that verbal morphology can be an indicator of PLI. The performance of children with PLI on all of the suffixes tested (the causative, the aorist, the future and the evidential) was significantly lower than the age-matched TD children. Using an age-matched control group allowed the tasks to differentiate deviant language skills. Differentiating deviant language skills is crucial for diagnosing. Additionally, the tasks designed in the current study provide an opportunity for Turkish speakers to demonstrate their competence in using these suffixes.

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## Appendix A – Experiment 1

### The Causative Task

Target items:

1. “Çocuk yapboz parçalarını birleştiriyor.”  
‘The child is putting together the puzzle.’
2. “Kadın bir kızı ata bindiriyor.”  
‘The woman is helping the child get on a horse.’
3. “Annesi çocuğu ders çalıştırıyor.”  
‘The mother is making her child study.’
4. “Adam bardağa su dolduruyor.”  
‘The man is filling the glass with water.’
5. “Adam köpeğini dolaştırıyor.”  
‘The man is taking the dog to an outing.’
6. “Kadın tepsiyi döndürüyor.”  
‘The woman is turning the tray.’
7. “Trafik polisi arabayı durduruyor.”  
‘The policeman is stopping the car.’
8. “Anne bebeğini parkta gezdiriyor.”  
‘The mother is walking her child.’
9. “Palyaço çocuğu güldürüyor.”  
‘The clown is making the child laugh.’
10. “Çocuk boyaları birbirine karıştırıyor.”  
‘The boy is mixing the paints.’
11. “Kız çocuğu kaydırıyor.”  
‘The girl is pushing the boy down a slide.’
12. “Kız saçını kestiriyor.”  
‘The student is making the teacher angry.’
13. “Öğrenci öğretmeni kızdırıyor.”  
‘The man is cutting the girl’s hair.’
14. “Çocuk kuklayı konuşturuyor.”  
‘The boy is making the puppet talk.’
15. “Kız köpeği koşturuyor.”  
‘The girl is making a dog run.’
16. “Anne çocuklarına oyuncakları paylaştırıyor.”  
‘The mother is making them share.’
17. “Kedi kendini sevdiriyor.”  
‘The cat is making the girl pet itself.’
18. “Kadın atkısını kapıya sıkıştırıyor.”  
‘The girl has gotten her scarf caught.’
19. “Çocuk küpü deliğe uyduruyor.”  
‘The child is making the block fit.’
20. “Kedi kızı uyandırıyor.”  
‘The cat is waking the girl up.’



21. “Annesi çocuğa ödevini yaptırıyor.”  
‘The mother is making the boy do his homework.’
22. “Kartonu kağıda yapıştırıyor.”  
‘She is clueing it on the paper.’
23. “Baba bebeğini yediriyor.”  
‘The father is making the baby eat.’
24. “Anne çocuğuna ilaç yutturuyor.”  
‘The mother is making the child swallow a pill.’

## The Aorist Task

Target items:

1. “Baba bana kahvaltı hazırlar mısın?”  
‘Dad, would you prepare me a breakfast?’
2. “Teyze saçımı kurutur musun?”  
‘Aunt will you dry my hair?’
3. “Teyze masa örtüsünü silkeler misin?”  
‘Aunt, would you shake the table cover?’
4. “Hala ayımı temizler misin?”  
‘Aunt, will you clean my teddy bear?’
5. “Hala masayı toplar mısın?”  
‘Aunt, will you clean up the table?’
6. “Teyze tişörtümü yıkar mısın?”  
‘Aunt, will you wash my shirt?’
7. “Baba annemi arar mısın?”  
‘Dad, will you call my mom?’
8. “Baba anahtarı çevirir misin?”  
‘Dad, will you turn the key?’
9. “Dayı camı kapatır mısın?”  
‘Uncle, will you close the window?’
10. “Teyze saçımı düzeltir misin?”  
‘Aunt, will you fix my hair?’
11. “Hala düğün resimlerini gösterir misin?”  
‘Aunt, will you show me pictures of your wedding?’
12. “Teyze beni sinemaya götürür müsün?”  
‘Aunt, will you take me to the movies?’
13. “Teyze çekirdekleri süpürür müsün?”  
‘Aunt, will you vacuum the sunflower seeds?’
14. “Baba sütümü ısıtır mısın?”  
‘Dad, will you warm up my milk?’
15. “Amca bana kurabiye verir misin?”  
‘Uncle, will you give me a cookie?’
16. “Baba yanıma gelir misin?”  
‘Dad, will you come near me?’
17. “Dayı oyuncak arabamı bulur musun?”  
‘Uncle, will you find my toy car?’

18. "Baba bana bakkaldan ikolata alır mısın?"  
'Dad, will you get me some chocolate from the store?'
19. "Hala bu aksam bizde kalır mısın?"  
'Aunt, will you stay over here tonight?'
20. "Baba arabayı durur musun?"  
'Dad, will you stop the car?'
21. "Amca reel kavanozunu aar mısın?"  
'Uncle, will you open the jam jar?'
22. "Teyze bir tane daha fotoğrafımı eker misin?"  
'Aunt, will you take another picture of me?'
23. "Teyze patateslerimi biraz daha ezer misin?"  
'Aunt, will you mash my potatoes some more?'
24. "Hala tabağı bulaşık makinesine koyar mısın?"  
'Aunt, will you put this in the washing machine?'
25. "Hala kaloriferi kısar mısın?"  
'Aunt, will you turn down the heat?'
26. "Baba ekmeğime tereyağı sürer misin?"  
'Dad, will you spread some butter on my bread?'
27. "Baba yemeğı tadar mısın?"  
'Dad, will you taste my food?'
28. "Teyze adimi yazar mısın?"  
'Aunt, will you write my name down?'
29. "Anneanne üstümü örter misin?"  
'Grandma, will you tuck me in?'

### **The Future Tense Task**

Target items:

1. "Oyuncaklarıyla oynayacak."  
'He will play with his toys.'
2. "Kolye takacak."  
'She will wear her necklace.'
3. "Müzık dinleyecek."  
'He will listen music.'
4. "Ormanda dolaşacak."  
'She will wander around.'
5. "Yaşlılara yardım edecek."  
'He will help old people.'
6. "Gülecek."  
'She will laugh.'
7. "Havlayacak."  
'He will bark tomorrow.'
8. "Televizyon seyredecek."  
'He will watch TV.'
9. "Koşacak."

- 'He will run.'
10. "Oyuncaklarını paylaşacaklar."  
'They will share toys.'
11. "Ağaca tırmanacak."  
'He will climb trees.'
12. "Erken uyanacak."  
'She will wake up early.'
13. "Yürüyecek."  
'He will walk.'
14. "Yüzecekler."  
'They will swim.'
15. "Üşüyecek."  
'She will be cold.'

### **The Future Conjecture Task**

Target items:

1. "Top birazdan pencereyi kıracak."  
'The ball will break the window.'
2. "Bütün ev balık kokacak."  
'The whole house will smell like fish.'
3. "İp kopacak."  
'It will snap.'
4. "Çamaşırlar kuruyacak."  
'The laundry will get dry.'
5. "Tekne batacak."  
'The boat will sink.'
6. "Küçük gelecek."  
'They will be too small for him.'
7. "Kedi fareyi yakalayacak."  
'The cat will catch the mouse.'
8. "Kuş cama çarpacak."  
'The bird will run into the window.'
9. "Eteğini yırtacak."  
'She will tear her skirt.'
10. "Islanacak."  
'He will get wet.'
11. "Portakalları sıkacak."  
'She will juice some oranges.'
12. "Kek yapacak."  
'She will bake her one.'
13. "Okula gidecek."  
'He will go to school.'

## The Evidential Inference Task

Target items:

1. “Çocuk vazoyu kırmış.”  
‘The boy must have broken the vase.’
2. “Çocuk duvarı boyamış.”  
‘The child must have painted the walls.’
3. “Kedi sütü içmiş.”  
‘The cat must have drunk the milk.’
4. “Çocuk defterindeki bir şeyi silmiş.”  
‘The child must have erased something.’
5. “Kedi ağaca çıkmış.”  
‘The cat must have climbed up the tree.’
6. “Yılan balığı yutmuş.”  
‘The snake must have swallowed a fish.’
7. “Rüzgar karttan evi yıkmış.”  
‘The wind must have knocked down the house of cards.’
8. “Köpek kitabı ısırılmış.”  
‘The dog must have bitten the book.’
9. “Kedi sütü dökmüş.”  
‘The cat must have spilled the milk.’
10. “Yağmur yağmış.”  
‘It must have rained.’
11. “Annesi bebeği öpmüş.”  
‘The woman must have kissed the boy.’
12. “Balon patlamış.”  
‘The balloon must have popped.’
13. “Canavar kurabiyeyi yemiş.”  
‘The cookie monster must have eaten the cookie.’
14. “Çocuk bisikletten düşmüş.”  
‘The child must have fallen off of a bike.’
15. “Gemi batmış.”  
‘The ship must have sunk.’

## The Evidential Hearsay Task

Target items:

1. “Kedisi dün evde lambayı kırmış.”  
‘Evidently, yesterday his cat broke a lamp.’
2. “Kedisi masanın üstüne atlamış.”  
‘Evidently, his cat jumped on the table.’
3. “Babası ona kırmızı bir bisiklet almış.”  
‘Evidently, his dad bought him a red bicycle.’

4. "Köpeği dün eve siyah gelmiş."  
'Evidently, yesterday his dog came home covered in black.'
5. "Kedisi çamura düşmüş."  
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'Evidently, his sister and him did somersaults.'
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8. "Ablası dün bütün gün öksürmüş."  
'Evidently, yesterday his sister coughed all day long.'
9. "Annesiyle beraber televizyon seyretmiş."  
'Evidently, his mom and him watched TV.'
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'Evidently, he tidied up my room.'
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'Evidently, he took a shower yesterday.'
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'Evidently, he went to the park.'
13. "Saklambaç oynamış."  
'Evidently, he played hide and seek.'
14. "Vapura binmiş."  
'Evidently, he got on a ferry.'
15. "Gazete okumuş."  
'Evidently, he read the newspaper.'

## Appendix B – Experiment 2

### The Causative Task

Practice items:

1. “Anne çocuklarına oyuncakları paylaşıyor.”  
'The mother is making them share.'
2. “Öğrenci öğretmeni kızdırıyor.”  
'The student is making the teacher angry.'

Target items:

1. “Çocuk yapboz parçalarını birleştiriyor.”  
'The child is putting together the puzzle.'
2. “Kadın bir kızı ata bindiriyor.”  
'The woman is helping the child get on a horse.'
3. “Annesi çocuğu ders çalıştırıyor.”  
'The mother is making her child study.'
4. “Adam bardağa su dolduruyor.”  
'The man is filling the glass with water.'
5. “Adam köpeğini dolaştırıyor.”  
'The man is taking the dog to an outing.'
6. “Kadın tepsiyi döndürüyor.”  
'The woman is turning the tray.'
7. “Trafik polisi arabayı durduruyor.”  
'The policeman is stopping the car.'
8. “Anne bebeğini parkta gezdiriyor.”  
'The mother is walking her child.'
9. “Palyaço çocuğu güldürüyor.”  
'The clown is making the child laugh.'
10. “Çocuk boyaları birbirine karıştırıyor.”  
'The boy is mixing the paints.'
11. “Kız saçını kestiriyor.”  
'The man is cutting the girl's hair.'
12. “Çocuk kuklayı konuşturuyor.”  
'The boy is making the puppet talk.'
13. “Kız köpeği koşturuyor.”  
'The girl is making a dog run.'
14. “Kedi kendini sevdireyor.”  
'The cat is making the girl pet itself.'
15. “Kadın atkısını kapıya sıkıştırıyor.”  
'The girl has gotten her scarf caught.'
16. “Kedi kızı uyandırıyor.”  
'The cat is waking the girl up.'
17. “Annesi çocuğa ödevini yaptırıyor.”

- 'The mother is making the boy do his homework.'
18. "Kartonu kağıda yapıştırıyor."  
'She is clueing it on the paper.'
19. "Baba bebeğini yediriyor."  
'The father is making the baby eat.'
20. "Anne çocuğuna ilaç yutturuyor."  
'The mother is making the child swallow a pill.'

## The Aorist Task

Practice items:

1. "Baba arabayı durur musun?"  
'Dad, will you stop the car?'
2. "Dayı camı kapatır misin?"  
'Uncle, will you close the window?'
3. "Teyze saçımı kurutur musun?"  
'Aunt will you dry my hair?'

Target items:

1. "Baba bana kahvaltı hazırlar mısın?"  
'Dad, would you prepare me a breakfast?'
2. "Teyze masa örtüsünü silkeler misin?"  
'Aunt, would you shake the table cover?'
3. "Hala ayımı temizler misin?"  
'Aunt, will you clean my teddy bear?'
4. "Hala masayı toplar mısın?"  
'Aunt, will you clean up the table?'
5. "Teyze tişörtümü yıkar mısın?"  
'Aunt, will you wash my shirt?'
6. "Baba annemi arar mısın?"  
'Dad, will you call my mom?'
7. "Baba anahtarı çevirir misin?"  
'Dad, will you turn the key?'
8. "Teyze saçımı düzeltir misin?"  
'Aunt, will you fix my hair?'
9. "Hala düğün resimlerini gösterir misin?"  
'Aunt, will you show me pictures of your wedding?'
10. "Teyze beni sinemaya götürür müsün?"  
'Aunt, will you take me to the movies?'
11. "Teyze çekirdekleri süpürür müsün?"  
'Aunt, will you vacuum the sunflower seeds?'
12. "Baba sütümü ısıtır mısın?"  
'Dad, will you warm up my milk?'

13. "Amca bana kurabiye verir misin?"  
'Uncle, will you give me a cookie?'
14. "Baba yanıma gelir misin?"  
'Dad, will you come near me?'
15. "Dayı oyuncak arabamı bulur musun?"  
'Uncle, will you find my toy car?'
16. "Baba bana bakkaldan ikolata alır mısınız?"  
'Dad, will you get me some chocolate from the store?'
17. "Hala bu aksam bizde kalır mısınız?"  
'Aunt, will you stay over here tonight?'
18. "Amca reel kavanozunu acar mısınız?"  
'Uncle, will you open the jam jar?'
19. "Teyze bir tane daha fotoğrafımı eker misin?"  
'Aunt, will you take another picture of me?'
20. "Teyze patateslerimi biraz daha ezer misin?"  
'Aunt, will you mash my potatoes some more?'
21. "Hala tabağı bulaşık makinesine koyar mısınız?"  
'Aunt, will you put this in the washing machine?'
22. "Hala kaloriferi kısar mısınız?"  
'Aunt, will you turn down the heat?'
23. "Baba ekmeğime tereyağı sürer misin?"  
'Dad, will you spread some butter on my bread?'
24. "Baba yemeği tadar mısınız?"  
'Dad, will you taste my food?'
25. "Teyze adımı yazar mısınız?"  
'Aunt, will you write my name down?'
26. "Anneanne üstümü örter misin?"  
'Grandma, will you tuck me in?'

### The Future Tense Task

Target items:

1. "Oyuncaklarıyla oynayacak."  
'He will play with his toys.'
2. "Kolye takacak."  
'She will wear her necklace.'
3. "Müzık dinleyecek."  
'He will listen music.'
4. "Ormanda dolaşacak."  
'She will wander around.'
5. "Yaşlılara yardım edecek."  
'He will help old people.'
6. "Gülecek."  
'She will laugh.'
7. "Havlayacak."



- 'He will bark tomorrow.'
8. "Televizyon seyredecek."  
'He will watch TV.'
9. "Koşacak."  
'He will run.'
10. "Oyuncaklarını paylaşacaklar."  
'They will share toys.'
11. "Ağaca tırmanacak."  
'He will climb trees.'
12. "Erken uyanacak."  
'She will wake up early.'
13. "Yürüyecek."  
'He will walk.'
14. "Yüzecekler."  
'They will swim.'
15. "Üşüyecek."  
'She will be cold.'

### The Future Conjecture Task

Target items:

1. "Top birazdan pencereyi kıracak."  
'The ball will break the window.'
2. "Bütün ev balık kokacak."  
'The whole house will smell like fish.'
3. "İp kopacak."  
'It will snap.'
4. "Çamaşırlar kuruyacak."  
'The laundry will get dry.'
5. "Tekne batacak."  
'The boat will sink.'
6. "Küçük gelecek."  
'They will be too small for him.'
7. "Kedi fareyi yakalayacak."  
'The cat will catch the mouse.'
8. "Kuş cama çarpacak."  
'The bird will run into the window.'
9. "Eteğini yırtacak."  
'She will tear her skirt.'
10. "İslanacak."  
'He will get wet.'
11. "Portakalları sıkacak."  
'She will juice some oranges.'
12. "Kek yapacak."  
'She will bake her one.'

13. “Okula gidecek.”  
‘He will go to school.’

### The Evidential Inference Task

Practice items:

1. “Rüzgar karttan evi yıkmış.”  
‘The wind must have knocked down the house of cards.’
2. “Yılan balığı yutmuş.”  
‘The snake must have swallowed a fish.’

Target items:

1. “Çocuk vazoyu kırmış.”  
‘The boy must have broken the vase.’
2. “Çocuk duvarı boyamış.”  
‘The child must have painted the walls.’
3. “Kedi sütü içmiş.”  
‘The cat must have drunk the milk.’
4. “Çocuk defterindeki bir şeyi silmiş.”  
‘The child must have erased something.’
5. “Kedi ağaca çıkmış.”  
‘The cat must have climbed up the tree.’
6. “Köpek kitabı ısırılmış.”  
‘The dog must have bitten the book.’
7. “Kedi sütü dökmüş.”  
‘The cat must have spilled the milk.’
8. “Yağmur yağmış.”  
‘It must have rained.’
9. “Annesi bebeği öpmüş.”  
‘The woman must have kissed the boy.’
10. “Balon patlamış.”  
‘The balloon must have popped.’
11. “Çocuk pastayı yemiş.”  
‘The boy must have eaten the cake.’
12. “Çocuk bisikletten düşmüş.”  
‘The child must have fallen off of a bike.’
13. “Gemi batmış.”  
‘The ship must have sunk.’

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